CLAIMS

1. A battery comprising:

(a) a container having a positive terminal and a negative terminal;

(b) a battery cell disposed within said container, said cell having a positive electrode, a negative electrode, and a cell voltage measured across said positive and said negative electrodes of said cell;

(c) a controller electrically coupled between said electrodes of said cell and said terminals of said container to form, from the cell voltage, an output voltage across the positive and negative terminals of the container; and

(d) a circuit responsive to a predetermined condition of said battery, the circuit being operable to uncouple the output voltage of the controller from the terminals of the container upon detection of said predetermined condition.

2. The battery of Claim 1 wherein said circuit is part of the controller and is operable for uncoupling the output voltage of the controller from said positive and negative terminals of the container upon detection of said predetermined condition.

3. The battery of Claim 1 wherein said circuit includes a current sensor coupled with said cell to measure a cell current, the circuit being responsive to a predetermined condition including an inverse polarity condition based upon the current sensor, and uncoupling the output voltage of the controller from the container terminals upon detection of the predetermined condition.

4. The battery of Claim 1 wherein said circuit includes a current sensor coupled with said cell to measure a cell current, the circuit being responsive to a predetermined condition including a short circuit condition based upon the current sensor, and uncoupling the output voltage of the controller from the container terminals upon detection of the predetermined condition.

5. The battery of Claim 1 wherein said circuit is operable for monitoring the cell voltage, the circuit being responsive to a predetermined condition including the cell voltage dropping below a predetermined voltage level, the circuit uncoupling the output voltage of the controller from the container terminals upon detection of the predetermined condition to generally prevent an over-discharge of the cell.

6. The battery of Claim 1 wherein said circuit is operable for monitoring the cell internal impedance, the circuit being responsive to a predetermined condition including the cell internal impedance exceeding a predetermined impedance, the circuit uncoupling the output voltage of the controller from the container terminals upon detection of the predetermined condition to generally prevent an over-discharge of the cell.

7. The battery of Claim 1 wherein said circuit is operable for monitoring the cell voltage, the circuit being responsive to a predetermined condition including the cell voltage exceeding a predetermined voltage level, the circuit uncoupling the output voltage of the controller from the container terminals upon detection of the predetermined condition to generally prevent an over-charge of the cell.

8. The battery of Claim 1 wherein said circuit is operable for monitoring the pressure within said container, the circuit being responsive to a predetermined condition including the container pressure exceeding a pressure limit, the circuit uncoupling the output voltage of the controller from the container terminals upon detection of the predetermined condition.

9. The battery of Claim 1 wherein said circuit is operable for monitoring a hydrogen concentration within said container, the circuit being responsive to a predetermined condition including the container hydrogen concentration exceeding a hydrogen limit, the circuit uncoupling the output voltage of the controller from the container terminals upon detection of the predetermined condition.

10. The battery of Claim 1 wherein said circuit is operable for monitoring a temperature within said container, the circuit being responsive to a predetermined condition including the container temperature exceeding a temperature limit, the circuit uncoupling the output voltage of the controller from the container terminals upon detection of the predetermined condition.

11. The battery of Claim 1 wherein said predetermined condition includes the condition wherein the current demand of a load attached to the battery exceeds the capabilities of the controller, the circuit being further operable, upon uncoupling the output voltage of the controller from the terminals of the container, to couple the cell directly to said container terminals to form the cell voltage at the container terminals.

12. A multiple-cell battery comprising:

a first container having a positive terminal and a negative terminal;

a first battery cell disposed within said first container, said first battery cell having a positive electrode, a negative electrode, and a battery cell voltage measured across said positive and said negative electrodes of the first battery cell;

a first controller electrically coupled between the electrodes of said first battery cell and the terminals of said first container to create a first container output voltage measured across said first container positive and negative terminals;

SUB B3

a second container electrically coupled to said first container, said second container having a positive terminal and a negative terminal;

a second battery cell disposed within said second container, said second battery cell having a positive electrode, a negative electrode, and a battery cell voltage measured across said positive and said negative electrodes of the second battery cell;

a second controller electrically coupled between said electrodes of said second battery cell and said terminals of said second container to create a second container output voltage measured across said second container positive and negative terminals; and

a circuit responsive to a predetermined condition of said multiple cell battery, the circuit being electrically coupled to one of the first and second controllers to uncouple the respective one of the first and second container output voltages from the terminals of the respective one of the first and second containers upon detection of said predetermined condition.

13. The multiple cell battery of claim 12, further comprising a housing having an output positive terminal electrically coupled to said first container positive terminal and an output negative terminal electrically coupled to said second container negative terminal, said first container negative terminal electrically connected to said second container positive terminal, said housing substantially containing said first and second container.

14. The multiple cell battery of Claim 12 wherein said circuit includes a current sensor coupled with at least one cell to measure the current of that cell, the circuit being responsive to a predetermined condition including an inverse polarity condition based upon the current sensor, and uncoupling the

output voltage of the controller from the container terminals associated with that cell upon detection of the predetermined condition.

15. The multiple cell battery of Claim 12 wherein said circuit includes a current sensor coupled with at least one cell to measure the current of that cell, the circuit being responsive to a predetermined condition including a short circuit condition based upon the current sensor, and uncoupling the output voltage of the controller from the container terminals associated with that cell upon detection of the predetermined condition.

16. The multiple cell battery of Claim 12 wherein said circuit is operable for monitoring a cell voltage of at least one of the cells, the circuit being responsive to a predetermined condition including the cell voltage dropping below a predetermined voltage level, the circuit uncoupling the output voltage of the controller from the container terminals associated with that cell upon detection of the predetermined condition to generally prevent an over-discharge of the cell.

17. The multiple cell battery of Claim 12 wherein said circuit is operable for monitoring a cell internal impedance of at least one of the cells, the circuit being responsive to a predetermined condition including the cell internal impedance exceeding a predetermined impedance, the circuit uncoupling the output voltage of the controller from the container terminals associated with that cell upon detection of the predetermined condition to generally prevent an over-discharge of the cell.

18. The multiple cell battery of Claim 12 wherein said circuit is operable for monitoring a cell voltage of at least one of the cells, the circuit being responsive to a predetermined condition including one of the cell voltage exceeding a predetermined voltage level, the circuit uncoupling the output voltage of the controller from the container terminals associated with that cell upon detection of the predetermined condition to generally prevent an over-charge of the cell.

19. The multiple cell battery of Claim 12 wherein said circuit is operable for monitoring a pressure within at least one of said containers, the circuit being responsive to a predetermined condition including the container pressure exceeding a pressure limit, the circuit uncoupling the output voltage of the controller from the container terminals associated with that container upon detection of the predetermined condition.

20. The multiple cell battery of Claim 12 wherein said circuit is operable for monitoring a hydrogen concentration within at least one of the containers, the circuit being responsive to a predetermined condition including the container hydrogen concentration exceeding a hydrogen limit, the circuit uncoupling the output voltage of the controller from the container terminals associated with that container upon detection of the predetermined condition.

21. The multiple cell battery of Claim 12 wherein said circuit is operable for monitoring a temperature within at least one of the containers, the circuit being responsive to a predetermined condition including one of the container temperature exceeding a temperature limit, the circuit uncoupling the output voltage of the controller from the container terminals upon detection of the predetermined condition.

22. The multiple cell battery of Claim 12 wherein said predetermined condition includes the condition wherein the current demand of a load attached to the multiple cell battery exceeds the capabilities of at least one of the controllers, the circuit being further operable, upon uncoupling the output voltage of the controller from the terminals of the container, to couple at least one of the cells directly to said respective container terminals to form the cell voltage at the respective container terminals.

23. The multiple cell battery of claim 12, wherein at least one of the said first and second battery cells comprises one of an electrochemical cell and a voltaic cell.

24. A method for extending the useful life of a battery comprising the steps of:

(a) providing a battery including:

(i) a container having a positive terminal and a negative terminal; and

(ii) a battery cell disposed within said container, said cell having a positive electrode, a negative electrode, and a cell voltage measured across said positive and said negative electrodes of said cell;

the method being characterized by:

(b) electrically coupling a controller between said electrodes of said cell and said terminals of said container to form, from the cell voltage, an output voltage across the positive and negative terminals of the container;

(c) in response to detection of a predetermined condition of the battery, uncoupling the output voltage of the controller from the terminals of the container.

25. The method of claim 24, wherein sensing a predetermined condition includes sensing a cell current exceeding a predetermined current level.

26. The method of claim 25, further comprising upon uncoupling the voltage of the controller from the terminals of the container, electrically coupling said positive electrode to said positive terminal and said negative electrode to said negative terminal.

27. The method of claim 24, wherein sensing a predetermined condition includes sensing a cell voltage being one of below an over-discharge voltage and above an overcharge voltage.